PATENT
Customer No. 22,852
Attorney Docket No. 07965.0004-00000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: James B. GODDARD et al.	)	Group Art Unit: 3679
Application No.: 10/037,219	)	Examiner: G. Collins
Filed: November 9, 2001	)	Confirmation No.: 5658
For: PIPE HAVING WATER-TIGHT IN-LINE BELL	)	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

DECLARATION UNDER 37 C.F.R. § 1.131

I, James B. Goddard, state that I am one of the named applicants of the above-identified application and am one of the co-inventors of the subject matter described and claimed therein. Prior to November 10, 2000, William V. Shaffer and I had completed in this country the invention as described and claimed in the above-identified application as evidenced by the following:

1. A memorandum dated prior to November 10, 2000 in which William V. Shaffer details, on its second and third pages, our idea to add a reinforcing ring to the bell.

2. A memorandum dated prior to November 10, 2000, from me to William V. Shaffer, which suggests adding the reinforcing ring as the best way to achieve water-tight joint performance.

3. Minutes of a Strategic Planning Meeting that took place prior to November 10, 2000, illustrating that the reinforcing ring was discussed at the meeting as a way to make joints water-tight.

The relevant dates of these documents have been redacted for confidentiality, but all dates are prior to November 10, 2000. Additional information has been redacted for confidentiality, and is not necessary to establish possession of the claimed invention.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that the statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patents issuing thereon.

Dated: 9/30/2004

By: James B. Goddard
James B. Goddard.

Strategies for Improving IB Joint Tolerances and Strength to Achieve WT Joint Performance

NEW PRODUCTS & ENGINEERING

TO: Tom King

FROM: Bill Shaffer

DATE: [redacted]

If ADS were able to design a reliable, watertight (ASTM D 3212 10.8 psi) inline bell (IB) joint, there could be significant cost savings related to the elimination of bells that are currently injection or blow-molded. Our current IB joint was designed to provide an outstanding silt-tight joint at minimal cost (short bells, small gaskets). In order to upgrade to a watertight IB joint, we need to address the issues of [redacted] BELL STRENGTH. [redacted] To improve bell strength, there is a long list of alternatives that we might choose to pursue.

[redacted]

[redacted]

[redacted]

[redacted]

Ways to Improve Bell Rigidity

Currently, the standard for proving your product is "watertight" is ASTM D 3212 that requires testing at 10.8 psi. Unfortunately, PE expands slowly under pressure. When a bell is not thick enough, it "grows" until it leaks. This is what currently happens with our current IB bells during testing for approximately 24" and larger sizes. Some options for overcoming this challenge include:

- Thicker bells
  - Pull both layers of the dual wall extrusion together in the bell. This is a feature promised in the past by Drossbach and currently offered by Corma and Hegler.
  - Add a post-forming reinforcing ring to the bell OD - this might be an extruded ribbon, a fiberglass band, a mechanical fastener, or a welded ring of some sort. This may be the most practical approach.
  - Employ an "accumulator" on the extruder to make the bells thicker without adding weight to all 20-feet of pipe.
  - Add an ID reinforcing ring with or without an integrated bell gasket - similar to our last cleated prototype IB joint.
- Stronger Resin
  - HMW PE would give incremental improvement
  - Glass-Reinforced PE or PP would be significantly stronger
- Redefine "Watertight"
  - ADS could choose to promote a different (lower) standard for defining "WT" performance. This would be very difficult at best and would not be accepted in some markets for sure.

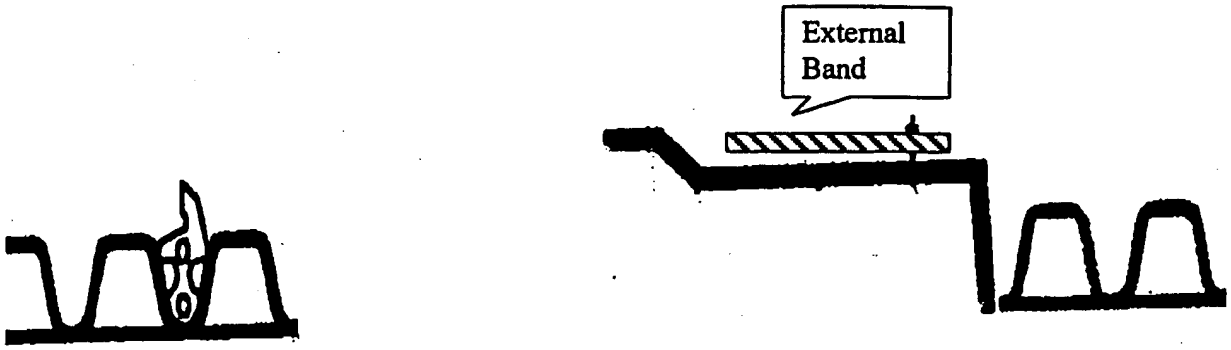
Conclusions

Watertight IB is achievable, and there will be added costs to both developing and producing WT IB when compared with our current ST IB pipe. The things that must happen are:

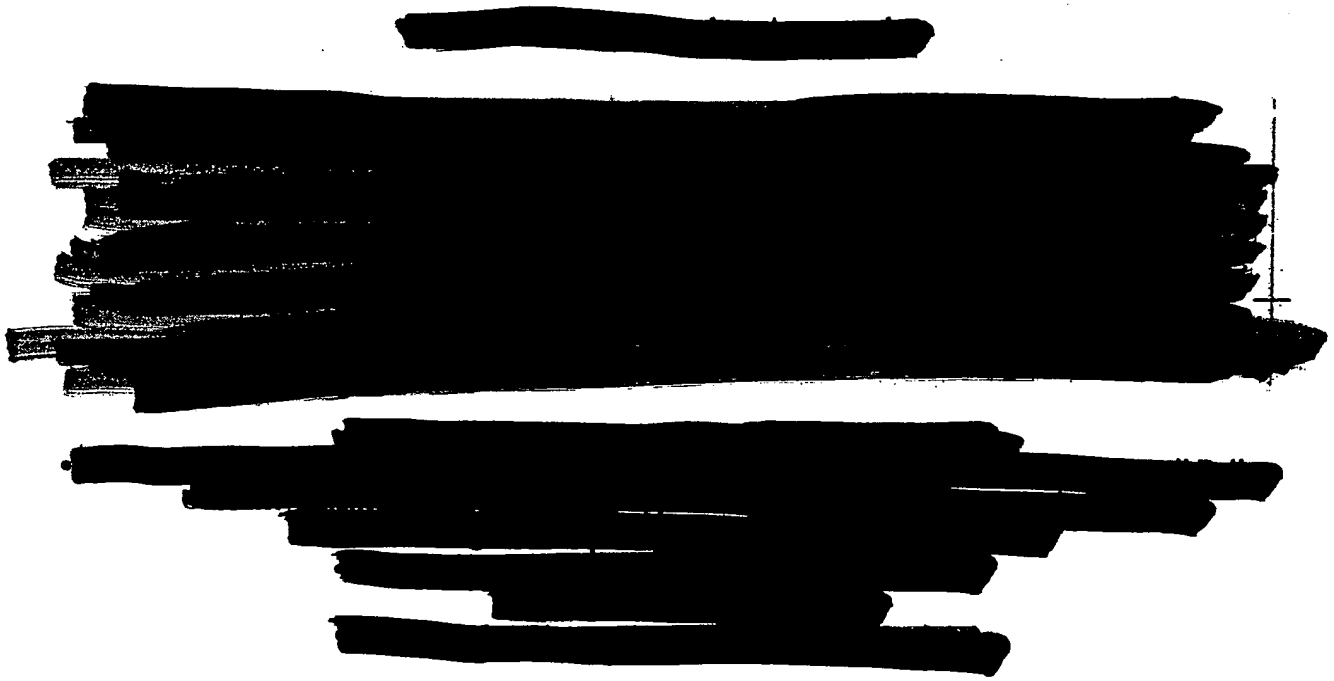
1. [redacted]
2.
3.
4.

Two (of many) Alternative Approaches to WT IB Joint Performance

"Conventional" Approach



- Full size spigot corrugations and conventional valley gasket
- Larger ID Bell and Larger Lead-In
- External Reinforcing Band for Added Bell Strength
- Added Downstream Operation - More difficult storage and installation with larger bell
- Guaranteed to Work
- Could design with ST and WT options so Bell Tooling would not have to Change



[redacted]

To: Bill Shaffer

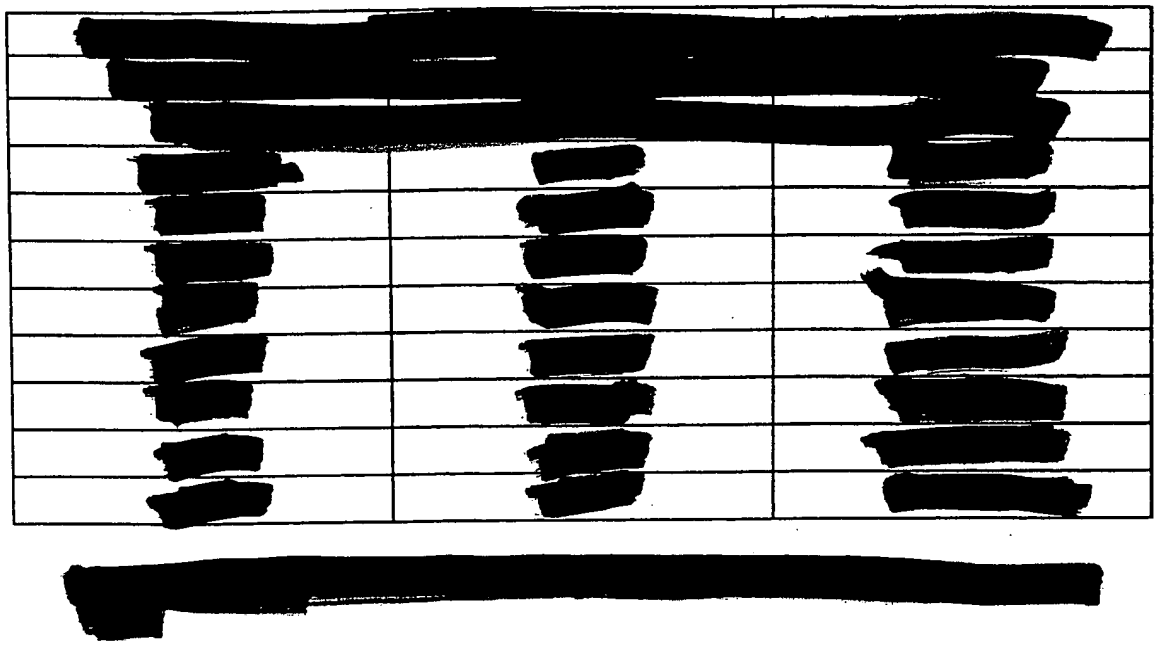
From: Jim Goddard

Subject: Improving IB Joint Tolerances and Strength to Achieve WT Joint Performance

Comments:

[redacted]

[redacted]



6. Adding a post forming reinforcing ring of fiberglass or some similar material might be the best answer. We should try this. There are issues:
   a. will the bells continue to shrink after the reinforcing ring is installed?
   b. Cost?
   c. Production issues?

7. Redefining "watertight" would not be easy, nor would it be widely accepted.

These are my very quick comments.

cc: Tom King

ADS Strategic Planning Meeting – [redacted]

Product Improvements/Production Technology

1. **Water Tight IB Pipe:** There are two separate issues that must be solved or resolved in order to make IB pipe water tight by the current ASTM D 3212 definition:

[redacted]

b. Because of the inherent thinness of the bells, as formed by the current process, the bells tend to expand when tested under pressure. At 10.8 PSI internal pressure the hoop stress on the bell is equal to the pressure times the diameter divided by two times the wall thickness.

$$\text{Hoop stress (PSI)} = PD/2t$$

where: P = the internal pressure in PSI
D = the pipe (or in this case the bell) diameter (in)
t = the wall thickness (in) (in this case of the bell)

It is necessary to stiffen the bell in the hoop direction in order to stop or minimize the expansion of the bell under internal pressure. One option is to thicken the bell. This is difficult to do without impacting the total weight of the pipe or without impacting the production rates currently enjoyed. A second option is to reinforce the bell with some non-viscoelastic (but compatible) material. It appears this can be done relatively inexpensively by wrapping the bell in the seating area of the gasket with a fiberglass, polyester, or other wrap and encapsulating it in PE. This would substantially stiffen the bell in the hoop direction. It would require a post-production operation. It would not have to be done to all IB bells, only those sold into applications requiring this level of water-tightness.

Bill Shaffer is currently working on this project.